

WHAT IS CLAIMED IS:

1 1. A system for detecting faults in an optical network, comprising:
2 a first node and a second node; and
3 an amplifier node coupled between the first node and the second node, the
4 amplifier node configured to detect a fault on an optical link connecting the amplifier node
5 and the first node and generate a fault report upon detection of the fault, the amplifier node is
6 further configured to forward the fault report to the second node.

1 2. The system according to claim 1 wherein upon receiving the fault
2 report from the amplifier node, if the second node is capable of switching traffic, the second
3 node initiates a switching action to restore traffic between the first node and the second node;
4 and if the second node is not capable of switching traffic, the second node forwards the fault
5 report to a third node.

1 3. The system according to claim 2 wherein the fault report is forwarded
2 until the fault report is received by a node which is capable of switching traffic.

1 4. The system according to claim 1 wherein the second node is capable of
2 switching traffic and is configured to:
3 detect a fault on an optical link carrying optical signals into the second node;
4 and
5 upon receipt of the fault report from the amplifier node, prioritize the fault
6 report and the fault detected by the second node.

1 5. The system according to claim 1 wherein the amplifier node is further
2 configured to receive and pass a fault report from another amplifier node to the second node.

1 6. The system according to claim 1 wherein the amplifier node is
2 configured to:
3 receive a fault report from another amplifier node;
4 prioritize the received fault report and the generated fault report; and
5 forward whichever fault report that has a higher priority to the second node.

1 7. The system according to claim 1 wherein the optical network is a bi-
2 directional line switched ring network.

1 8. The system according to claim 1 wherein the fault on the optical link is
2 detected based on a loss-of-signal condition.

1 9. The system according to claim 8 wherein the amplifier node
2 comprises:
3 an input signal power detector configured to monitor input power of the
4 optical link; and
5 control logic configured to evaluate output from the input signal power
6 detector to determine if the loss-of-signal condition exists.

1 10. A method for detecting faults in an optical network having an amplifier
2 node coupled between a first node and a second node, comprising:
3 detecting a loss-of-signal condition on an optical link carrying optical signals
4 from the first node to the amplifier node;
5 causing the amplifier node to generate a fault report reporting occurrence of
6 the loss-of-signal condition; and
7 forwarding the fault report to the second node.

1 11. The method of claim 10 further comprising:
2 if the second node is capable of switching traffic, causing the second node to
3 initiate a switching action to restore traffic between the first node and the second node; and
4 if the second node is not capable of switching traffic, forwarding the fault
5 report from the second node to another node.

1 12. The method of claim 11 further comprising:
2 forwarding the fault report until the fault report is received by a node which is
3 capable of switching traffic.

1 13. The method of claim 10 further comprising:
2 if the second node is capable of switching traffic, detecting a fault on an
3 optical link carrying optical signals into the second node; and upon receipt of the fault report
4 from the amplifier node, prioritizing the fault report and the fault detected by the second
5 node.

1 14. The method of claim 10 further comprising:

2 causing the amplifier node to receive and pass a fault report from another
3 amplifier node to the second node.

1 15. The method of claim 10 further comprising:
2 causing the amplifier node to receive a fault report from another amplifier
3 node;
4 prioritizing the received fault report and the generated fault report; and
5 forwarding whichever fault report that has a higher priority to the second
6 node.

1 16. The method of claim 10 wherein the optical network is a bi-directional
2 line switched ring network.

1 17. An optical network comprising:
2 a plurality of switching nodes connected to one another, at least one switching
3 node capable of switching traffic; and
4 a plurality of amplifier nodes;
5 wherein:
6 at least one amplifier node is coupled between selective pairs of
7 switching nodes; and
8 the least one amplifier node is configured to detect a fault on an
9 incoming optical link carrying optical signals into that amplifier node, generate a fault report
10 upon detection of the fault, and forward the fault report to a neighboring node.

1 18. The optical network of claim 17 wherein:
2 upon receiving the fault report, if the neighboring node is a switching node,
3 the neighboring node initiates a switching action to restore traffic; and if the neighboring
4 node is not a switching node, the neighboring node forwards the fault report to another node.

1 19. The optical network of claim 18 wherein the fault report is forwarded
2 until the fault report is received by a switching node.

1 20. The optical network of claim 17 wherein the at least one switching
2 node is configured to:
3 detect a fault on an incoming optical link carrying optical signals into that
4 switching node; and

5 upon receipt of a fault report from an amplifier node, prioritize the received
6 fault report and the fault detected by that switching node.

1 21. The optical network of claim 17 wherein the at least one amplifier
2 node is further configured to receive and pass a fault report from another amplifier node to a
3 switching node.

1 22. The optical network of claim 17 wherein the at least one amplifier
2 node is configured to:
3 receive a fault report from another amplifier node;
4 prioritize the received fault report and the generated fault report; and
5 forward whichever fault report that has a higher priority to the neighboring
6 node.

1 23. The optical network of claim 17 wherein the optical network is a bi-
2 directional line switched ring network.

1 24. The optical network of claim 17 wherein the fault on the incoming
2 optical link is detected based on a loss-of-signal condition.

1 25. The optical network of claim 24 wherein the at least one amplifier
2 node comprises:
3 an input signal power detector configured to monitor input power of the
4 incoming optical link; and
5 control logic configured to evaluate output from the input signal power
6 detector to determine if the loss-of-signal condition exists.

1 26. An amplifier node for use in an optical network, comprising:
2 an input signal power detector configured to monitor input power of an
3 incoming optical link received by the amplifier node; and
4 control logic configured to:
5 evaluate output from the signal power detector to determine if a loss-
6 of-signal condition thereby indicating a fault on the incoming optical link; and
7 generate a fault report reporting the loss-of-signal condition.

1 27. The amplifier node of claim 26 wherein the control logic is further
2 configured to forward the fault report to a switching node to allow the switching node to
3 initiate a switching action.

1 28. The amplifier node of claim 26 wherein the control logic is further
2 configured to:
3 receive a fault report from another amplifier node;
4 prioritize the received fault report and its own generated fault report; and
5 forward whichever fault report that has a higher priority to a switching node.

1 29. The amplifier node of claim 26 wherein the optical network is a bi-
2 directional line switched ring network.

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